

SUPPORTING MATERIAL

Effect of different types of regular exercise on physical fitness in adults with overweight or obesity: systematic review and meta-analyses

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Table S1. Keywords included in database search strategy

Obesity	Physical activity	Age	Topic
Overweight Obesity Obese	Physical activit* Exercise Sport Endurance activity Endurance activities Aerobic activity Aerobic activities Cardiovascular activit* Resistance training Strength training Muscle-strengthening Weight-Lifting program High-intensity interval training HIIT Physical conditioning	Adults (NOT child, children, adolescents, pediatric) Humans	Cardio-respiratory fitness, physical fitness, maximal oxygen uptake, maximal oxygen consumption, musc* fitness, musc* strength, VO _{2max} , aerobic capacity, walking distance, anaerobic capacity

Table S2. Quality assessment of the studies included in the meta-analyses.

Reference	Criteria														Total "Yes"	Total "No"	Total "other"	Quality rating
	1	2	3	4	5	6	7	8	9	10	11	12	13	14				
Ahmadzad 2007 ²¹	Yes	NR	NR	No	NR	NR	Yes	No	NR	Yes	NR	No	Yes	Yes	5	3	7	FAIR
Arad 2015 ⁴⁸	Yes	NR	NR	NR	NR	Yes	No	Yes	Yes	Yes	Yes	No	Yes	No	7	3	4	POOR
Baekkerud 2015 ⁵⁶	Yes	Yes	NR	No	NR	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	9	3	2	FAIR
Banitalebi 2019 ⁴⁴	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	No	10	4	0	FAIR
Batrakoulis 2018 ⁴²	Yes	Yes	Yes	No	NR	NR	Yes	No	Yes	Yes	Yes	Yes	Yes	No	9	3	2	FAIR
Blond 2019 ¹⁰	Yes	Yes	Yes	No	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	10	4	0	FAIR
Bonfante 2017 ⁴⁷	Yes	NR	NR	No	NR	Yes	No	CD	Yes	Yes	Yes	No	Yes	No	6	4	4	POOR
Brooker 2019 ²²	Yes	Yes	Yes	No	NR	Yes	Yes	No	Yes	Yes	Yes	No	Yes	No	9	4	1	FAIR

Cao 2019 ²³	Yes	NR	NR	No	NR	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	8	3	3	FAIR
Cheema 2015 ⁵⁷	Yes	Yes	Yes	No	NR	Yes	Yes	No	No	No	Yes	No	Yes	Yes	8	5	1	GOOD
Chen 2017 ⁷⁰	Yes	NR	NR	No	Yes	Yes	No	Yes	NR	Yes	Yes	No	Yes	No	7	4	3	POOR
Chin 2020 ¹¹	Yes	NR	NR	No	NR	Yes	No	No	Yes	Yes	Yes	No	Yes	No	6	5	3	POOR
Church 2007 ²⁴	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	12	2	0	GOOD
Cocks 2016 ⁵⁸	Yes	NR	NR	No	NR	Yes	Yes	Yes	NR	Yes	Yes	Yes	Yes	Yes	9	1	4	GOOD
De Strijcker 2018 ⁵⁹	Yes	Yes	NR	No	NR	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	9	3	2	GOOD
Donnelly 2013 ²⁵	Yes	Yes	Yes	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	10	4	0	POOR
Duscha 2005 ²⁶	Yes	Yes	NR	No	NR	Yes	No	NR	Yes	Yes	Yes	No	Yes	No	7	4	3	POOR
Emerenziani 2014 ²⁷	Yes	NR	NR	No	NR	Yes	Yes	No	NR	Yes	Yes	No	Yes	Yes	7	3	4	GOOD
Fisher 2015 ⁶⁰	Yes	Yes	Yes	No	NR	Yes	Yes	No	NR	Yes	Yes	No	Yes	Yes	9	3	2	GOOD
Fritz 2018 ⁷²	Yes	Yes	Yes	No	NR	Yes	Yes	No	Yes	Yes	Yes	No	Yes	No	9	4	1	FAIR

Gerosa-Neto 2019 ²⁸	Yes	NR	NR	No	NR	Yes	No	No	Yes	Yes	Yes	NR	Yes	No	6	4	4	POOR
Hara 2005 ⁴⁵	Yes	Yes	Yes	No	NR	Yes	Yes	Yes	NR	Yes	Yes	NR	Yes	Yes	10	1	3	GOOD
Higgins 2016 ⁶⁵	Yes	NR	NR	No	NR	Yes	Yes	CD	Yes	Yes	Yes	Yes	Yes	No	8	2	4	FAIR
Ho 2012 ²⁹	Yes	Yes	NR	No	NR	Yes	Yes	Yes	NR	Yes	Yes	Yes	Yes	No	9	2	3	FAIR
Irving 2008 ³⁰	Yes	NR	NR	No	NR	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	8	3	3	POOR
Irwin 2003 ¹²	Yes	Yes	Yes	No	NR	Yes	Yes	Yes	CD	Yes	Yes	No	Yes	Yes	10	2	2	GOOD
Jabbour 2015 ⁴⁹	Yes	NR	NR	No	NR	Yes	Yes	Yes	NR	Yes	Yes	NR	Yes	Yes	8	1	5	GOOD
Jurio-Iriarte 2018 ³¹	Yes	NR	NR	No	NR	Yes	Yes	No	NR	Yes	Yes	No	Yes	No	6	4	4	FAIR
Kang 2012 ⁷⁹	Yes	NR	NR	No	NR	Yes	No	Yes	NR	Yes	Yes	No	Yes	No	6	4	4	FAIR
Keating 2015 ³²	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	12	2	0	GOOD
Keating 2017 ⁴³	Yes	Yes	Yes	No	No	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	10	4	0	GOOD
Kim 2020 ⁵³	Yes	Yes	Yes	No	NR	Yes	No	Yes	NR	Yes	Yes	No	Yes	No	8	4	2	POOR

Kim 2016 ³³	Yes	NR	NR	No	NR	Yes	No	CD	Yes	Yes	Yes	No	Yes	No	6	4	4	POOR
Kirk 2003 ³⁴	Yes	NR	NR	No	NR	Yes	No	NR	Yes	Yes	Yes	NR	Yes	No	6	3	5	POOR
Kong 2016 ⁶¹	Yes	NR	NR	No	NR	Yes	Yes	No	NR	Yes	Yes	Yes	Yes	No	7	3	4	FAIR
Liao 2018 ⁷³	Yes	NR	NR	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	10	2	2	GOOD
Lunt 2014 ⁶²	Yes	Yes	NR	No	Yes	Yes	No	No	NR	Yes	Yes	Yes	Yes	Yes	9	3	2	FAIR
Martins 2015 ⁶³	Yes	NR	NR	No	NR	Yes	No	No	Yes	Yes	Yes	No	Yes	No	6	5	3	POOR
Moghadasi 2012 ³⁵	Yes	NR	NR	No	NR	Yes	Yes	Yes	NR	Yes	Yes	No	Yes	Yes	8	2	4	GOOD
Nader 2016 ³⁶	No	NR	NR	No	NR	Yes	Yes	Yes	NR	Yes	Yes	NR	Yes	Yes	7	2	5	POOR
Park 2015 ⁴⁶	Yes	NR	NR	No	NR	Yes	Yes	Yes	NR	Yes	Yes	No	Yes	Yes	8	2	4	GOOD
Park 2017 ⁸⁰	Yes	NR	NR	No	NR	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	9	2	3	GOOD
Plotnikoff 2010 ⁷⁴	Yes	NR	NR	No	NR	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	8	3	3	GOOD
Ramos 2019 ³⁷	Yes	NR	NR	No	NR	Yes	Yes	Yes	NR	Yes	No	No	Yes	Yes	7	3	4	FAIR

Rayes 2019 ³⁸	No	Yes	Yes	No	NR	Yes	Yes	No	Yes	Yes	Yes	No	Yes	No	8	4	2	POOR
Reichkender 2014 ³⁹	Yes	NR	NR	No	NR	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	8	3	3	FAIR
Robinson 2015 ⁶⁶	Yes	NR	NR	No	NR	Yes	Yes	Yes	NR	Yes	Yes	No	Yes	No	7	3	4	FAIR
Rustaden 2017 ⁷⁵	Yes	Yes	Yes	No	NR	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	9	3	2	FAIR
Sarsan 2006 ⁷¹	Yes	Yes	Yes	No	NR	Yes	No	Yes	NR	Yes	Yes	No	Yes	No	8	4	2	POOR
Sawczyn 2015 ⁵⁴	Yes	NR	NR	No	NR	Yes	Yes	Yes	NR	Yes	Yes	No	Yes	Yes	8	2	4	GOOD
Sawyer 2016 ⁸⁷	Yes	NR	NR	No	NR	Yes	Yes	Yes	NR	Yes	Yes	Yes	Yes	No	8	2	4	FAIR
Schjerve 2008 ¹³	Yes	NR	NR	No	NR	Yes	Yes	Yes	NR	Yes	Yes	No	Yes	Yes	8	2	4	GOOD
Schroeder 2019 ¹⁴	Yes	Yes	Yes	No	NR	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	11	2	1	GOOD
Skrypnik 2015 ⁵⁵	Yes	NR	NR	No	NR	Yes	Yes	No	Yes	Yes	Yes	No	Yes	No	7	4	3	FAIR

Slentz 2011 ¹⁵	Yes	NR	NR	No	NR	Yes	No	NR	NR	Yes	Yes	No	Yes	No	5	4	5	POOR
Smith-Ryan 2016 ⁵⁰	Yes	Yes	NR	No	NR	CD	Yes	Yes	NR	Yes	Yes	Yes	Yes	No	8	2	4	FAIR
Sun 2018 ⁶⁴	Yes	NR	NR	No	NR	Yes	Yes	Yes	NR	Yes	Yes	No	Yes	No	7	3	4	FAIR
Tong 2018 ⁵¹	Yes	NR	NR	No	NR	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	8	3	3	FAIR
Trilk 2011 ⁵²	Yes	NR	NR	No	NR	Yes	Yes	Yes	NR	Yes	Yes	Yes	Yes	Yes	9	1	4	GOOD
Utter 1998 ⁴⁰	Yes	NR	NR	No	NR	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	8	3	3	FAIR
Vasconcelos 2016 ⁷⁶	Yes	Yes	Yes	No	Yes	CD	Yes	Yes	Yes	Yes	Yes	No	Yes	No	10	3	1	FAIR
Vella 2017 ⁶⁷	Yes	NR	NR	No	NR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	9	2	3	FAIR
Vincent 2006 ⁷⁷	Yes	NR	NR	No	NR	Yes	No	CD	Yes	Yes	Yes	No	Yes	No	6	4	4	POOR
Wong 2019 ⁷⁸	Yes	Yes	Yes	NR	NR	Yes	Yes	Yes	NR	Yes	Yes	Yes	Yes	Yes	11	0	3	GOOD
Zemkova 2017 ⁸¹	Yes	NR	NR	No	NR	CD	Yes	Yes	NR	Yes	Yes	No	Yes	Yes	7	2	5	FAIR
Zhang 2017 ⁴¹	Yes	NR	NR	No	NR	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	8	3	3	FAIR

Criteria controlled trials: (1) Randomized study; (2) Adequate randomization method; (3) Treatment allocation concealment; (4) Blinding treatment assignment; (5) Blinding outcome assessors; (6) Similar baseline characteristics; (7) Drop-out rate <20%; (8) Differential drop-out rate between groups <15%; (9) High adherence; (10) Similar background treatments; (11) Valid and reliable outcome measures; (12) Sample size justification; (13) Pre-specified outcomes/subgroups; (14) All randomized participants analysed (ITT analysis); NR, Not Reported; NA, Not Applicable; CD, Cannot Determine.

Table S3. Characteristics of the randomised controlled trials included in the meta-analysis on the effect of aerobic exercise training on VO_{2max} .

Reference	Population	Number of participants	Sex (%F)	Age (y)	Intervention (aerobic training)	Comparison (no exercise)	Intervention duration	Supervision
Ahmadizad 2007 ²¹	Obese, sedentary mean BMI 28	16	0	Mean ~ 41	Running, 3x pw 20-30 min 75-85%HR _{max}	No exercise	12 weeks	yes
Blond 2019 ¹⁰	Overweight and obese (BMI 25-35), inactive	130	52	20-45	5x pw 1. Active commuting (bicycle) 2. Moderate activity 3. Vigorous activity (walking, running, rowing, cross trainer or stationary cycling) F 320 kcal/d, M 420 kcal/d	No exercise	6 months	no
Brooker 2019 ²²	Overweight and obese	20	50	18-60	Treadmill walking or running and other types of aerobic exercise, 250 min pw moderate-to-vigorous intensity 1. morning (6-9 AM), 2. evening (4-7 PM)	No exercise	12 weeks	partly
Cao 2019 ²³	BMI >25, sedentary past 2 years	30	100	60-69	Walking/jogging 3x 60 min pw at maximal fat oxidation intensity	No exercise	12 weeks	yes

Chin 2020 ¹¹	BMI > 23, BF > 20, < 3 h pw physical activity	43	0	18-30	Running, 3x pw 30 min 60% HRR	No exercise	8 weeks	yes
Church 2007 ²⁴	BMI 25-43, postmenopausal, sedentary (not exercising > 20 minutes on ≥ 3 d/wk, and taking < 8000 steps/d assessed over the course of 1 week)	464	100	45-74	Treadmill or cycle ergometer, 3-4x pw 50% VO _{2peak} ; 1. 4 kcal/kg pw 2. 8 kcal/kg pw 3. 12 kcal/kg pw	No exercise	6 months	yes
Donnelly 2013 ²⁵	BMI 25-40, planned PA \leq 500 kcal/wk	141	55	18-30	Treadmill walking/jogging, 5x pw 400 kcal/session, 70-80% HRmax	No exercise	10 months	yes
Duscha 2005 ²⁶	BMI 25-35, sedentary, dyslipidemia	282	?	40-65	1. walking 19 km/wk at 40 to 55% VO _{2peak} , 2. jogging 19 km/wk at 65 to 80% VO _{2peak} , 3. Jogging 32 km/wk at 65 to 80% VO _{2peak}	No exercise	7-9 months	yes

Emerenziani 2014 ²⁷	Obese, elderly, with T2DM, mean BMI 35, sedentary	30	?	Mean 67	Treadmill or cycle ergometer, 2x pw 50 min at VT	No exercise	3 months	yes
Gerosa-Neto 2019 ²⁸	BMI ≥ 30 , $\leq 2x$ pw exercise, $VO_{2max} < 47$ ml/min.kg	36	0	18-35	Treadmill running, 3x pw, intensity and duration unclear	No exercise	6 weeks	yes
Ho 2012 ²⁹	BMI > 25 or WC $> 80/90$, $< 1h$ pw moderate intensity exercise	46	84	40-66	5x pw 30 min 60%HRR	No exercise	12 weeks	partly
Irving 2008 ³⁰	WC ≥ 80 plus 2 or more MetS criteria	37	100	Mean 51	Walking/running 1. low intensity: 3 to 5x pw, 300 to 400 kcal/session, RPE 10-12 2. high intensity: 3 to 4x pw, 300 to 400 kcal/session, RPE 15-17	No exercise	16 weeks	yes
Jurio-Iriarte 2018 ³¹	BMI ≥ 25 , inactive, stage 1 or 2 hypertension	48	25	Mean 56	Treadmill or cycle ergometer; 2x pw 45 min 50-75% HRR	No exercise	1. 8 weeks 2. 12 weeks 3. 16 weeks	yes

Keating 2015 ³²	BMI > 25, <3x pw exercise	48	65	29-59	Cycle ergometer and walking, 3x pw 1. high intensity/low volume: 30 to 45 min at 70% VO _{2max} 2. low intensity/high volume: 45 to 60 min at 50% VO _{2max} 3. low intensity/low volume: 30 to 45 min at 50% VO _{2max}	No exercise	8 weeks	partly
Kim 2016 ³³	Obese, no exercise	29	40	19-35	Treadmill or cycle ergometer and treadmill mountain climber, 5x pw, 60 min 65-80% HR _{max}	No exercise	8 weeks	yes
Kirk 2003 ³⁴	BMI 27-32, sedentary (< 500 kcal pw PA)	131	1. 100 2. 0	19-30	Treadmill walking, from 3x pw 20 min 60%HRR to 5x pw 45 min 75%HRR at 6 months	No exercise	16 months	yes
Moghadasi 2011 ³⁵	Overweight or obese (mean BMI 32), iactive	16	0	middle-aged	Treadmill, 4x pw 45 min at 75-80% VO _{2max}	No exercise	12 weeks	NR
Nader 2016 ³⁶	BMI ≥ 25	20	100	Mean 22	Running, 3x pw up to 3.2 km 70-75% HR _{max}	No exercise	12 weeks	NR
Ramos 2019 ³⁷	BMI ≥ 28, hypertensive	19	100	≥ 60	Jogging, 3x pw 50 min at 60% HR _{max}	No exercise	12 weeks	NR
Rayes 2019 ³⁸	BMI > 25, inactive	47	79	30-66	Treadmill running, 3x pw 60 min at VT	No exercise	8 weeks	yes

Reichkendler 2012 ³⁹	BMI 25-30, sedentary, VO _{2max} < 45 ml/min.kg	61	0	20-40	Running, bicycling, elliptical training, or rowing 3x pw >70%, 4x pw 50-70%VO _{2max} 1. moderate dose (300 kcal/d) 2. high dose (600 kcal/d)	No exercise	11 weeks	no
Schroeder 2019 ¹⁴	BMI 25-40, sedentary, elevated blood pressure or hypertension	34	61	45-74	Treadmill or cycle ergometer, 3x pw 60 min, 40 up to 70% (max 80%) HRR	No exercise	8 weeks	yes
Utter 1998 ⁴⁰	BMI 25-65	43	100	25-75	5x pw 45 min walking 60-80% HR _{max}	No exercise	12 weeks	yes
Zhang 2015 ⁴¹	BMI ≥ 25, BF ≥ 30, PA class 2x pw	31	100	18-22	cycle ergometer, 3-4x pw 200-300 kJ/session* at 60% VO _{2max}	No exercise	12 weeks	yes

HR_{max} = maximal heart rate; HRR = heart rate reserve; VT = ventilatory threshold; BMI is body mass index (kg/m²); BF = body fat (%); WC = waist circumference (cm); T2DM = type 2 diabetes mellitus; MetS = metabolic syndrome; RPE = rating of perceived exertion; F = female; pw = per week; PA = physical activity; NR = not reported; * authors use kJ/session, probably is kcal/session.

Table S4. Characteristics of the randomised controlled trials included in the meta-analysis on the effect of resistance exercise training on VO_{2max}.

Reference	Population	Number of participants	Sex	Age (y)	Intervention (resistance training)	Comparison (no or sham exercise)	Intervention duration	Supervision
Ahmadizad 2007 ²¹	Obese, sedentary, mean BMI 28	16	0	Mean 40	3x pw 50-60 min circuit weight training, 11 exercises, 4 sets, max 12 repetitions at 50-60% 1RM	No exercise	12 weeks	yes
Batrakoulis 2018 ⁴²	BMI 25-35, inactive	40	100	30-45	3x pw, up to 41 min circuit training 10-12 exercises, up to 3 sets, as many repetitions as possible (20-40 s)	No exercise	40 weeks	yes
Ho 2012 ²⁹	BMI > 25 or WC >80/90, < 1h pw moderate intensity exercise	47	84	40-66	5x pw, 5 exercises 4 sets, 8-12 repetitions at 10RM	No exercise	12 weeks	no
Keating 2017 ⁴³	BMI ≥ 25, inactive	29	86	29-59	3x pw, 10 exercises, 3 sets, 8-12 repetitions, 80-85% 1RM	Sham exercise	8 weeks	yes
Kim 2016 ³³	BMI≥23 or BF ≥25(M) or 30(F)	29	40	19-35	5x pw, 5-6 exercises, 3 sets, 65-80% 1RM	No exercise	8 weeks	yes

Schroeder 2019 ¹⁴	BMI 25-40, sedentary	34	61	45-74	3x pw 60 min, 12 exercises, up to 3 sets, 10-14 maximal repetitions	No exercise	8 weeks
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BMI = body mass index (kg/m²); BF = body fat (%); T2DM = type 2 diabetes mellitus; F = female; pw = per week; 1RM = 1 repetition maximum; 10RM = 10 repetition maximum

Table S5. Characteristics of the randomised controlled trials included in the meta-analysis on the effect of combined aerobic and resistance exercise training on $\text{VO}_{2\text{max}}$.

Reference	Population	Number of participants	Sex (%F)	Age (y)	Intervention (combined aerobic and resistance exercise)	Comparison (no or sham exercise)	Intervention duration
Banitalebi 2019 ⁴⁴	Overweight with T2DM	35	100	30-65	3x pw treadmill or cycle ergometer exercise up to 30 min/session at 70%HR _{max} 2-3 sets of 10-12 repetitions up to 10-RM, 5 muscle groups	No exercise	10 weeks
Bonfante 2017 ⁴⁷	Overweight/obese, no regular exercise	54	0	middle-aged	3x pw 60 min, 3 sets 6-10 max repetitions plus walking/running at 55-85% $\text{VO}_{2\text{peak}}$	No exercise	24 weeks
Hara 2005 ⁴⁵	BMI > 25, no regular exercise	14	0	Mean 19	3x pw treadmill or cycle ergometer exercise >30 min per session at ~50% $\text{VO}_{2\text{max}}$ plus 2-3x pw 50-60 min 7 exercises, 3 sets 10 repetitions at 80% 1RM	No exercise	5 months
Ho 2012 ²⁹	BMI > 25 or WC >80/90, < 1h pw moderate intensity exercise	46	84	40-66	5x pw, 15 min treadmill exercise at 60% HRR and 5 exercises, 2 sets, 8-12 repetitions at 10-RM	No exercise	12 weeks

Irwin 2003 ¹²	BMI \geq 25 (or \geq 24 and BF>33%) sedentary	173	100	50-75	5x pw; at least 1x pw treadmill or cycle ergometer exercise up to 45 min at 60-75% HR _{max} plus 5 exercises, 2 sets of 10 repetitions Other sessions at home (walking, aerobics, and bicycling)	Stretching	12 months
Park 2015 ⁴⁶	Abdominal obesity, post-menopausal, no regular exercise	20	100	Post-menopausal	3x pw, running 40min up to 56-75%HRR and 3 sets 10-12 repetitions, 10 exercises up to 70% 1RM	No exercise	12 weeks
Schroeder 2019 ¹⁴	BMI 25-40, sedentary, elevated blood pressure or hypertension	35	61	45-74	3x pw 30 min treadmill or cycle ergometer exercise at up to 70% HRR plus 8 exercises, 2 sets, 10-14 maximal repetitions	No exercise	8 weeks

HRR = heart rate reserve; HR_{max} = maximal heart rate; BMI = body mass index (kg/m²); BF = body fat (%); T2DM = type 2 diabetes mellitus; F = female; pw = per week; 1RM = 1 repetition maximum; 10RM = 10 repetition maximum

Table S6. Characteristics of the randomised controlled trials included in the meta-analysis on the effect of high-intensity interval training on $\text{VO}_{2\text{max}}$.

Reference	Population	Number of participants	Sex (%F)	Age (y)	Intervention (aerobic training)	Comparison (no exercise)	Intervention duration	Supervision
Arad 2015 ⁴⁸	BMI > 25 African-American	28	100	20-40	Cycle ergometer, 3x pw 24 min, 4 intervals, of 30-60s 75-90%HRR/180-210s 50%HRR	No exercise	14 weeks	yes
Bantitalebi 2019 ⁴⁴	BMI 25-48, with T2DM, <20 min structured exercise pw	35	100	30-65	Cycle ergometer, 3x pw 4 intervals of 30 s all-out/2 min 50W	No exercise	10 weeks	yes
Chin 2020 ¹¹	BMI > 23, BF > 20, < 3 h pw physical activity	87	0	18-30	30-m shuttle runs, 12 bouts of 1 min 90%HRR/1 min 70%HRR 1. 3x pw 2. 2x pw 3. 1x pw	No exercise	8 weeks	yes
Gerosa-Neto 2019 ²⁸	BMI ≥ 30 , $\leq 2x$ pw exercise, $\text{VO}_{2\text{max}} < 47$ ml/min.kg	36	0	18-35	Cycle ergometer, 3x pw, intensity and duration unclear	No exercise	6 weeks	yes
Jabbour 2015 ⁴⁹	Obese, inactive (< 1 h pw)	24	46	young	Cycle ergometer, 3x pw 6 repetitions, 6s all-out /2 min passive recovery	No exercise	6 weeks	yes

Jurio-Iriarte 2018 ³¹	BMI \geq 25, inactive, stage 1 or 2 hypertension	47	25	Mean 56	2x pw 45 min: Treadmill 4 repetitions 4 min 76-95%HRR/3 min 50-75%HRR, or cycle ergometer 18 repetitions 30s high intensity/60s moderate intensity	No exercise	1. 8 weeks 2. 12 weeks 3. 16 weeks	yes
Smith-Ryan 2016 ⁵⁰	BMI > 25, sedentary	32	100	18-55	Cycle ergometer, 3x pw 1. 10 repetitions 1 min 90% VO _{2peak} /1 min rest 2. 5 repetitions 2 min 80-100% VO _{2peak} /1 min rest	No exercise	3 weeks	yes
Tong 2018 ⁵¹	BF > 30, attending PE class 2x pw but no other exercise training	54	100	18-23	3-4 x pw 1. SIT: cycle ergometer, 80 repetitions, 6s resistance (start 1 kp, gradually increasing if 80 repetitions were sustained without undue fatigue) /9s passive recovery 2. prolonged HIIT: cycle ergometer, 4 min 90% VO _{2max} /3 min passive recovery up to 400 kJ/session	No exercise	12 weeks	yes
Trilk 2010 ⁵²	BMI > 25, sedentary	28	100	Mean ~ 30	Cycle ergometer, 3x pw, 4-7 repetitions 30s resistance 0.05kg/kg at maximal rpm/4 min active recovery	No exercise	4 weeks	yes
Zhang 2015 ⁴¹	BMI \geq 25, BF \geq 30, PA class < 2x pw	31	100	18-22	Cycle ergometer, 3-4x pw 200-300 kJ/session* 4 min 90% VO _{2max} /3 min passive recovery	No exercise	12 weeks	yes

HRR = heart rate reserve; BMI = body mass index (kg/m^2); BF = body fat (%); T2DM = type 2 diabetes mellitus; F = female; pw = per week; SIT = sprint interval training; HIIT = high-intensity interval training; * authors use kJ/session, probably is kcal/session.

Table S7. Characteristics of the randomised controlled trials included in the meta-analysis comparing the effects of aerobic and resistance training on VO_{2max} in adults with overweight or obesity.

Reference	Population	Number of participants	Sex (%F)	Age (y)	Intervention (resistance training)	Comparison (aerobic training)	Intervention duration	Supervision
Ahmadizad 2007 ²¹	Obese, sedentary, mean BMI 28	16	0	Mean ~ 40	3x pw 50-60 min circuit weight training, 11 exercises, 4 sets, max 12 repetitions at 50-60% 1RM	Running, 3x pw 20-30 min 75-85%HRmax	12 weeks	yes
Ho 2012 ²⁹	BMI > 25 or WC >80/90	51	84	40-66	5x pw, 5 exercises 4 sets, 8-12 repetitions at 10RM	5x pw 30 min 60%HRR	12 weeks	partly
Kim 2016 ³³	Obese, no exercise	38	45	19-35	5x pw, 5-6 exercises, 3 sets, 65-80% 1RM	Treadmill or cycle ergometer and treadmill mountain climber, 5x pw, 60 min 65-80% HRmax	8 weeks	yes
Kim 2020 ⁵³	BMI≥25 inactive (≤1x pw, ≤30 min)	38	0	30-64	3x pw 90 min 6 exercises 10-12 repetitions at 50% 1RM, 1-2 min rest in between	aerobic training 60 min outdoor jogging/running 65-85% HRmax	12 weeks	yes

Sawczyn 2015 ⁵⁴	overweight premenopausal, no previous exercise training	29	100	40-49	3x pw 11 exercises, 8- 12 repetitions 60-65% 1RM	Cycle or rowing ergometer, 3x pw 80 min, HR 136-156 bpm	16 weeks	yes
Schjerve 2008 ¹³	BMI > 30	26	80	> 20	3x pw 1 exercise, 4 series, 5 repetitions 90% 1RM plus 2 exercises, 3 series, 30 repetitions	Treadmill walking or running, 3x pw 47 min 60-70% HRmax	12 weeks	partly
Schroeder 2019 ¹⁴	BMI 25-40, sedentary, elevated blood pressure or hypertension	34	61	45-74	3x pw 60 min, 12 exercises, up to 3 sets, 10-14 maximal repetitions	Treadmill or cycle ergometer, 3x pw 60 min, 40 up to 70% (max 80%) HRR	8 weeks	yes
Slentz 2011 ¹⁵	BMI 26-35 sedentary (< 2 x pw), mild-to-moderate dyslipidemia	100	56	18-70	3x pw, 8 exercises, 3 sets 8-12 repetitions	Treadmill, elliptical trainers, cycle ergometer or combination, ~19.2 km/wk at 75% VO ₂ peak	8 months	yes

HRR = heart rate reserve; HR_{max} = maximal heart rate; BMI = body mass index (kg/m²); BF = body fat (%); WC = waist circumference (cm); F = female; pw = per week; 1RM = 1 repetition maximum; 10RM = 10 repetition maximum.

Table S8. Characteristics of the randomised controlled trials included in the meta-analysis comparing the effects of aerobic and combined aerobic plus resistance training on VO_{2max} in adults with overweight or obesity.

Reference	Population	Number of participants	Sex (%F)	Age (y)	Intervention (combined aerobic plus resistance training)	Comparison (aerobic training)	Intervention duration	Supervision
Ho 2012 ²⁹	BMI > 25 or WC >80/90, < 1h pw moderate intensity exercise	50	84	40-66	5x pw 15 min aerobic at 60%HRR, 15 min Resistance: 3 exercises 2 sets of 10 repetitions, 5 exercises 1 set of 10 repetitions	5x pw 30 min 60%HRR	12 weeks	partly
Schroeder 2019 ¹⁴	BMI 25-40, sedentary, elevated blood pressure or hypertension	35	61	45-74	3x pw 60 min 30 min aerobic 40 up to 70% (max 80%) HRR, 30 min resistance 8 exercises, 2 sets 10-14 maximal repetitions	Treadmill or cycle ergometer, 3x pw 60 min, 40 up to 70% (max 80%) HRR	8 weeks	yes
Skrypnik 2015 ⁵⁵	BMI ≥30, WC>80, BF≥33%	44	100	18-65	3x pw 60 min 20 min variable strength exercises plus 25 min aerobic exercise cycle ergometer at 50-80% HRmax	Cycle ergometer, 3x pw 60 min 50-80%HRmax	3 months	yes

Slentz 2011 ¹⁵	BMI 26-35 sedentary (< 2 x pw), mild-to- moderate dyslipidemia	92	56	18-70	Treadmill, elliptical trainers, cycle ergometer or combination, 3x pw~19.2 km/wk (12 miles/wk) at 75% VO _{2peak} plus 8 exercises, 3 sets 8–12 repetitions	Treadmill, elliptical trainers, cycle ergometer or combination, 3x pw ~19.2 km/wk (12 miles/wk) at 75% VO _{2peak}	8 months	yes
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HRR = heart rate reserve; HR_{max} = maximal heart rate; BMI = body mass index (kg/m²); BF = body fat (%); WC = waist circumference (cm); F = female; pw = per week.

Table S9. Characteristics of the randomised controlled trials included in the meta-analysis comparing the effects of aerobic and high-intensity interval (HIIT) training on VO_{2max} in adults with overweight or obesity.

Reference	Population	Number of participants	Sex	Age (y)	Intervention (HIIT)	Comparison (aerobic training)	Intervention duration	Supervision
Baekkerud 2016 ⁵⁶	BMI \geq 25	30	60	\geq 18	3x pw 45 min treadmill running/walking 1. 4 intervals 4 min 85-95% HR _{max} /3 min 70% HR _{max} 2. 10 intervals 1 min 90% HR _{max}	3x pw 45 min treadmill running/walking 70% HR _{max} (EE equivalent with HIIT group 1)	6 weeks	yes
Cheema 2015 ⁵⁷	BMI > 25, WC > 94 (M) or > 80 (F), inactive (<3x pw)	12	50	> 18	4x pw 50 min HIIT boxing (2 min/1 min rest) 3 sets of 5 exercises, RPE 15-17/20	4x pw 50 min brisk walking (as fast as possible)	12 weeks	partly
Chin 2020 ¹¹	BMI \geq 23, BF > 20, <3h pw PA	76	0	18-30	30-m shuttle runs 12 bouts 90% HRR/1 min recovery 70% HRR 1. 3x pw 2. 2x pw 3. 1x pw	3x pw 30 min 60% HRR	8 weeks	yes

Cocks 2016 ⁵⁸	BMI \geq 30, sedentary (\leq 1h structured PA pw)	16	0	young	Cycle ergometer 3x pw 4-7 30-s intervals 200% W_{max} /120s 30W	Cycle ergometer 5x pw 40-60 min \sim 65% VO_{2max}	4 weeks	NR
De Strijcker 2018 ⁵⁹	BMI 28-36, HbA1c $<$ 6.5%, sedentary ($<$ 1h pw)	16	0	42-57	Cycle ergometer 2x pw 40 min, 2x 10 15-s intervals 100 rpm, resistance 100-110% HR_{VT} /45s 40-60 rpm, resistance 50-55% HR_{VT} , 1x 10 min 60 rpm, 100-110% HR_{VT}	Cycle ergometer 2x pw 40 min, 60 rpm, resistance 100-110% HR_{VT}	10 weeks	yes
Fisher 2015 ⁶⁰	BMI 25-35, sedentary ($<$ 30 min structured PA pw)	28	0	17-22	Cycle ergometer 3x pw 20 min 4 sets 4 min 15% PP/30s 85% PP	Cycle ergometer 5x pw 45-60 min 55-65% VO_{2max}	6 weeks	yes
Gerosa-Neto 2019 ²⁸	BMI \geq 30, \leq 2x pw exercise, $VO_{2max} <$ 47 ml/min.kg	36	0	18-35	Cycle ergometer, 3x pw, intensity and duration unclear	3x pw 30 min 65% VO_{2max} (EE matched with HIIT)	6 weeks	NR
Higgins 2016 ⁶⁵	BMI \geq 25, $<$ 2x pw $<$ 30min PA	60	100	18-24	Cycle ergometer, 3x pw 30s all-out/4 min recovery, 5-7 repetitions	Cycle ergometer, 3x pw 20-30 min at 60-70% HRR	6 weeks	yes

Jurio-Iriarte 2018 ³¹	BMI \geq 25, inactive, stage 1 or 2 hypertension	45	25	Mean 56	2x pw 45 min Treadmill 4 repetitions 4 min 76-95%HRR/3 min 50-75%HRR, or cycle ergometer 18 repetitions 30s high intensity/60s moderate intensity	Treadmill or cycle ergometer; 2x pw 45 min 50-70% HRR	1. 8 weeks 2. 12 weeks 3. 16 weeks	yes
Kong 2016 ⁶¹	BMI > 23 and BF > 30%	22	100	18-30	Cycle ergometer, 4x pw 60 repetitions 8s up to 0.05xBW/12s recovery	Cycle ergometer, 4x pw 40 min 65% VO _{2max}	5 weeks	yes
Lunt 2014 ⁶²	BMI 28-40, <2x pw 30 min	49	74	35-60	Outside walking or jogging, 3x pw 1. Fast walking or jogging, 4 min 85-95% HR _{max} /3 min walking, 4 repetitions 2. 30-s all-out walking or jogging/4 min recovery walking, 3 repetitions	Outside walking, 3x pw 33 min 65-75% HR _{max}	12 weeks	yes
Martins 2016 ⁶³	Obese (mean BMI 33.3), sedentary	46	65	Mean 34.4	Cycle ergometer, 3x pw 1. 10 repetitions. 8s allout/12s 85-90% HR _{max} , 250 kcal 2. half of 1, 125 kcal.	Cycle ergometer, 70% HR _{max} (250 kcal)	12 weeks	yes
Robinson 2015 ⁶⁶	BMI > 24, inactive (<2x 30 min pw), prediabetes	39	82	NR	5x pw, 4 up to 10 repetitions 1 min at 85-90% W _{peak} /1 min recovery 20% W _{peak}	Cycle ergometer, treadmill or outdoor walking, elliptical trainer, 5x pw at 32.5% W _{peak}	2 weeks	partly

Sawyer 2016 ⁸⁷	BMI \geq 30, inactive	22	50	18-55	Cycle ergometer, 3x pw 10 repetitions 1 min at 90-95% HR _{max} /1 min 25-50W	Cycle ergometer, 3x pw 30 min at 70-75% HR _{max}	8 weeks	NR
Schjerve 2008 ¹³	BMI > 30	27	80	> 20	Treadmill walking or running, 4 intervals 4 min 85-95% HR _{max} /3 min 50-60% HR _{max}	Treadmill walking or running, 3x pw 47 min 60-70% HR _{max}	12 weeks	partly
Sun 2019 ⁶⁴	BMI \geq 23, BF \geq 30, sedentary	48	100	19-25	Cycle ergometer 3x pw 1. 80 repetitions 6s all-out, >100 rpm, 9s recovery, up to 5% of BM 2. 4 min 90% W _{max} /3 min passive recovery, matched for EE with 1.	Cycle ergometer, 3x pw 60% W _{max} matched for EE with 1.	12 weeks	yes
Vella 2017 ⁶⁷	overweight or obesity, sedentary	19	58	18-44	Treadmill, cycle ergometer, elliptical trainer, 4x pw, 10 repetitions, 1 min 75-80% HRR/1 min recovery 35-40% HRR	Treadmill, cycle ergometer, elliptical trainer, 4x pw, 20 min at 55-59% HRR	8 weeks	partly
Zhang 2015 ⁴¹	BMI \geq 25, BF \geq 30, PA class 2x pw	32	100	18-22	Cycle ergometer, 3x pw 200-300 kJ/session, 4 min 90% VO _{2max} /3 min passive rest	Cycle ergometer, 3x pw 200-300 kJ/session, 60% VO _{2max}	12 weeks	yes

HRR = heart rate reserve; HR_{\max} = maximal heart rate; BMI = body mass index (kg/m^2); BF = body fat (%); WC = waist circumference (cm);
BM = body mass; F = female; pw = per week; PA = physical activity; HR_{VT} = heart rate at ventilatory threshold; HRR = heart rate reserve; PP =
peak power from Wingate test; EE = energy expenditure; W_{peak} = maximal aerobic power; NR = not recorded.

Table S10. Characteristics of the randomised controlled trials included in the meta-analysis on the effects of aerobic training on muscle strength in adults with overweight or obesity.

Reference	Population	Number of participants	Sex (%F)	Age (y)	Intervention (aerobic training)	Comparison	Outcome	Intervention duration	Supervision
Cao 2019 ²³	BMI >25, sedentary past 2 years	30	100	60-69	Walking/jogging 3x pw 60 min at maximal fat oxidation intensity	No exercise	Hand grip (kg)	12 weeks	yes
Chen 2017 ⁷⁰	BMI \geq 25, sarcopenic obesity	44	84	65-75	Aerobics, 2x pw 60 min	No exercise	1. hand grip (kg) 2. maximum back extensor strength (kg) 3. maximum knee extensor strength (kg)	8 weeks	yes
Kim 2016 ³³	BMI \geq 23 or BF \geq 25 (M) or \geq 30 (F), no regular moderate/vigorous exercise past 3 months	29	35	19-35	Treadmill, cycle ergometer or mountain climber, 5x pw 60 min at 65-80% HR _{max}	No exercise	1.Extensor right (Nm/kg) 2. Flexor right (Nm/kg) 3. Hand grip (kg/kg)	8 weeks	yes

Ramos 2019 ³⁷	BMI \geq 28, hypertensive	19	100	\geq 60	Jogging, 3x pw 50 min at 60% HR _{max}	No exercise	Jump height (cm)	12 weeks	yes
Sarsan 2006 ⁷¹	BMI \geq 30, no current exercise training	50	100	20-60	Cycle ergometer, 3x pw 12-15 min up to 5x pw 30-45 min at 50-85% HRR	No exercise	1. 1RM quadiceps 2. 1RM biceps	13 weeks	yes
Schroeder 2019 ¹⁴	BMI 25-40, sedentary, elevated blood pressure or hypertension	34	F and M	45-74	Treadmill or cycle ergometer, 3x pw 60 min, 40 up to 70% (max 80%) HRR	No exercise	1. lower body 1RM (kg) 2. upper body 1RM (kg)	8 weeks	yes

HR_{max} = maximal heart rate; HRR = heart rate reserve; BMI = body mass index (kg/m²); BF = body fat (%); M = male, F = female; pw = per week; PA = physical activity.

Table S11. Characteristics of the randomised controlled trials included in the meta-analysis on the effects of resistance training on muscle strength in adults with overweight or obesity.

Reference	Population	Number of participants	Sex	Age (y)	Intervention (resistance training)	Comparison (no exercise)	Outcome	Intervention duration	Supervision
Batrakoulis 2018 ⁴²	BMI 25-35, inactive	40	100	30-45	3x pw, up to 41 min circuit training 10-12 exercises, up to 3 sets, as many repetitions as possible (20-40 s)	No exercise	Leg 1RM (kg)	40 weeks	yes
Chen 2017 ⁷⁰	BMI \geq 25, sarcopenic obesity	46	83	65-75	2x pw 10 exercises, 3 sets of 10-12 repetitions at 60-70% 1RM	No exercise	1. hand grip (kg) 2. back extensor (kg) 3. knee extensor (kg)	8 weeks	yes
Fritz 2018 ⁷²	BMI \geq 25, sedentary (< 60 min pw PA)	75	100	60-75	2x pw, 6 exercises, 3-4 sets, 10 repetitions, RPE 7-9 1. normal elastic band 2. elastic tube with handles	No exercise	1. upright rowing (kg) 2. squat (kg) 3. trunk extension (kg)	8 weeks	yes
Kim 2016 ³³	BMI \geq 23 or BF \geq 25 (M) or \geq 30 (F), no regular moderate/vigorous	29	40	19-35	5x pw, 5-6 exercises, 3sets, 10-12 repetitions at 65-80% 1RM	No exercise	1.Extensor right (Nm/kg) 2. Flexor right (Nm/kg) 3. Hand grip (kg/kg)	8 weeks	yes

	exercise past 3 months								
Liao 2018 ⁷³	Obesity and (pre)sarcope nia	56	100	60-80	3x pw, elastic band exercises, 3 sets of 10 repetitions, gentle concentric and eccentric contractions through full range of motion	No exercise	1. hand grip (kg/kg) 2. leg (N/kg)	12 weeks	yes
Plotnikoff 2010 ⁷⁴	BMI > 30, with T2DM, sedentary	48	67	?	3x pw, 8 exercises, 2-3 sets, up to 8-10 repetitions at 85% 1RM	No exercise	1. Bench press 1RM (kg) 2. Leg press 1RM (kg) 3. Upright row 1RM (kg)	16 weeks	yes
Rustaden 2017 ⁷⁵	BMI \geq 25, < 2x pw PA	143	100	18-65	3x pw, 9 exercises, 50- 100 repetitions, 45-60 min 1. Body pump 2. Resistance supervised 3. Resistance unsupervised	No exercise	1. Squat 1RM (kg) 2. Bench press 1RM (kg)	12 weeks	yes

Sarsan 2006 ⁷¹	BMI \geq 30, no current exercise training	50	100	20-60	3x pw 6 exercises, from 1 set of 10 repetitions at 40-60% 1RM up to 3 sets of 10 repetitions at 75-80% 1RM	No exercise	1. 1RM quadriceps 2. 1RM biceps	13 weeks	yes
Schroeder 2019 ¹⁴	BMI 25-40, sedentary, elevated blood pressure or hypertension	34	F and M	45-74	3x pw 60 min, 12 exercises, up to 3 sets 10-14 maximal repetitions	No exercise	1. lower body 1RM (kg) 2. upper body 1RM (kg)	8 weeks	yes
Vasconcelos 2016 ⁷⁶	BMI \geq 30, sarcopenic obesity (handgrip strength \leq 21 kg)	31	F	65-80	2x pw 60 min, concentric and eccentric exercises as fast as possible (isokinetic)	No exercise	Knee extensor (J/kg)	10 weeks	yes
Vincent 2006 ⁷⁷	BMI > 25	40(?)	F and M	60-83	3x pw, 1 set of 13 exercises, 8-13 repetitions at 50-80% 1RM	No exercise	1. Upper body (Nm) 2. Lower body (Nm)	24 weeks	yes
Wong 2009 ⁷⁸	BMI > 30 and \leq 40, sedentary (< 1h/wk), postmeno-pausal	20	F	50-65	3x pw, 4 exercises, 2-3 sets, 18-22 repetitions until fatigue	No exercise	Leg press 8RM (kg)	12 weeks	yes

BMI = body mass index (kg/m^2); BF = body fat (%); M = male, F = female; pw = per week; PA = physical activity, T2DM = type 2 diabetes mellitus.

Table S12. Characteristics of the randomised controlled trials included in the meta-analysis on the effects of combined aerobic plus resistance training on muscle strength in adults with overweight or obesity.

Reference	Population	Number of participants	Sex (%F)	Age (y)	Intervention (combined aerobic plus resistance training)	Comparison (no exercise)	Outcome	Intervention duration	Supervision
Bonfante 2017 ⁴⁷	overweight/obese, no regular exercise	54	0	middle-aged	3x pw 60 min, 3 sets of 6-10 max repetitions plus walking/running at 55-85% VO _{2peak}	No exercise	1. 1RM leg press (kg) 2. 1RM bench press (kg) 3. 1 RM arm curl (kg)	24 weeks	yes
Chen 2017 ⁷⁰	BMI ≥ 25, sarcopenic obesity	47	83	65-75	1x pw 10 exercises, 3 sets of 10-12 repetitions at 60-70% 1RM plus 1x pw 60 min aerobics	No exercise	1. hand grip (kg) 2. maximum back extensor strength (kg) 3. maximum knee extensor strength (kg)	8 weeks	yes
Kang 2012 ⁷⁹	Obese, no exercise	12	100	21-23	3x pw 40-65 min, circuit weight training plus jogging at 50-70% HRR	No exercise	1. back (kg) 2. hand grip (kg)	12 weeks	NR

Park 2015 ⁴⁶	Abdominal obesity, postmenopausal, no regular exercise	20	100	Middle-aged	3x pw 30-40 min treadmill, up to 75% HRR plus 30 minutes of resistance exercises, 3 sets 10-12 repetitions up to 70% 1RM	No exercise	1. hand grip (kg) 2. Back (kg)	12 weeks	NR
Park 2017 ⁸⁰	BMI \geq 25, sarcopenia	50	100	\geq 65	5x pw 50-80 min, elastic band 2-3 sets up to 12-15 repetitions (3x pw) plus walking 30-50 min at RPE 13-17	No exercise	Hand grip right (kg)	24 weeks	yes
Schroeder 2019 ¹⁴	BMI 25-40, sedentary, elevated blood pressure or hypertension	35	61	45-74	3x pw 30 min 12 exercises, up to 3 sets 10-14 maximal repetitions plus 3x pw 30 min treadmill or cycle ergometer up to 70% HRR	No exercise	1. lower body 1RM (kg) 2. upper body 1RM (kg)	8 weeks	yes

BMI = body mass index (kg/m²); M = male, F = female; pw = per week; NR = not recorded; HRR = heart rate reserve; RPE = rating of perceived exertion; 1RM = 1 repetition maximum.

Table S13. Characteristics of the randomised controlled trials included in the meta-analysis comparing the effects of resistance training and aerobic training on muscle strength in adults with overweight or obesity.

Reference	Population	Number of participants	Sex (% F)	Age (y)	Intervention (resistance training)	Comparison (aerobic training)	Outcome	Intervention duration	Supervision
Chen 2017 ⁷⁰	BMI \geq 25, sarcopenic obesity	46	83	65-75	2x pw 10 exercises, 3 sets of 10-12 repetitions at 60-70% 1RM	2x pw 60 min aerobics	1. hand grip (kg) 2. maximum back extensor strength (kg) 3. maximum knee extensor strength (kg)	8 weeks	yes
Kim 2016 ³³	BMI \geq 23 or BF \geq 25 (M) or \geq 30 (F), no regular moderate/vigorous exercise past 3 months	38	45	19-35	5x pw, 5-6 exercises, 3sets, 10-12 repetitions at 65-80% 1RM	Treadmill or cycle ergometer and treadmill mountain climber, 5x pw, 60 min 65-80% HR _{max}	1.Extensor right (Nm/kg) 2. Flexor right (Nm/kg) 3. Hand grip (kg/kg)	8 weeks	yes
Kim 2020 ⁵³	BMI \geq 25, inactive (\leq 1x pw, \leq 30 min)	38	0	30-64	3x pw, 90 min, 7 exercises, 3 sets, 10-12 repetitions at 50% 1RM	Outdoor jogging/running, 3x pw 60 min upto 65-85% HR _{max}	Knee extensor (Nm/kg)	12 weeks	yes
Sarsan 2006 ⁷¹	BMI \geq 30, no current exercise training	52	100	20-60	3x pw 6 exercises, from 1 set of 10 repetitions at 40-60% 1RM up to 3 sets of	Cycle ergometer, from 3x pw 12-15 min to 5x pw 30-	1. 1RM quadriceps 2. 1RM biceps	13 weeks	yes

					10 repetitions at 75-80% 1RM	45 min at 50-85% HRR			
Schjerve 2008 ¹³	BMI > 30	26	80	> 20	3x pw 1 exercise, 4 series, 5 repetitions at 90% 1RM and 2 exercises, 3 series, 30 repetitions	Treadmill walking or running, 3x pw 47 min 60-70% HR _{max}	Leg 1RM (kg)	12 weeks	partly
Schroeder 2019 ¹⁴	BMI 25-40, sedentary, elevated blood pressure or hypertension	34	61	45-74	3x pw 60 min, 12 exercises, up to 3 sets 10-14 maximal repetitions	Treadmill or cycle ergometer, 3x pw 60 min, 40 up to 70% (max 80%) HRR	1. lower body 1RM (kg) 2. upper body 1RM (kg)	8 weeks	yes
Zemkova 2017 ⁸¹	Overweight/obese	17	0	Mean 38	2-3x pw, 4-5 exercises, 2-5 sets, 8-12 repetitions, 57-82% 1RM	Aerobic dancing, running or spinning, 3x pw 60 min at 70-85% HR _{max}	1. leg press (N) 2. squat jump (W/kg)	3 months	yes

BMI = body mass index (kg/m²); BF = body fat (%); M = male, F = female; pw = per week; HR_{max} = maximal heart rate; HRR = heart rate reserve; 1RM = 1 repetition maximum.

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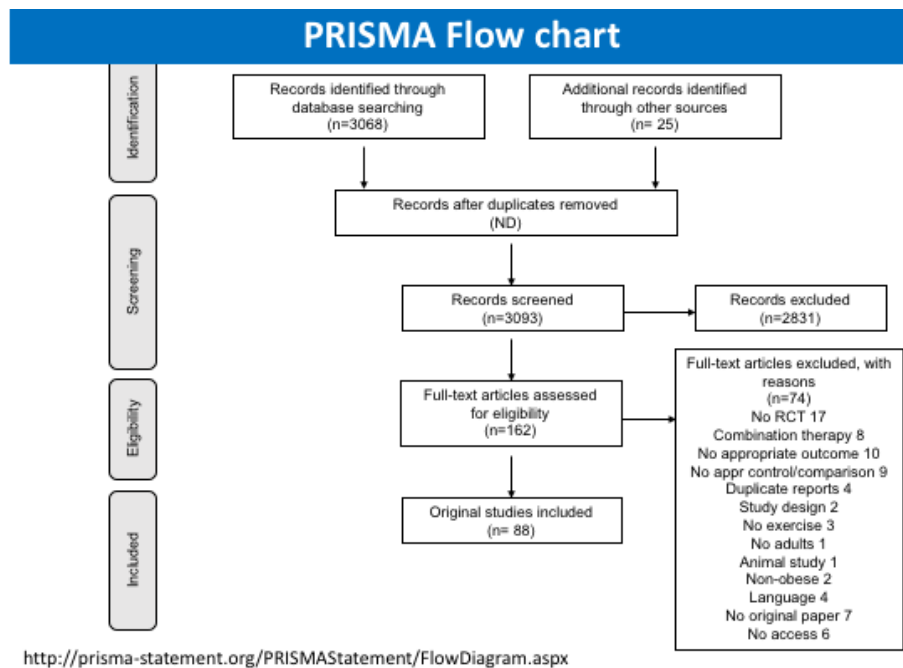


Figure S1. Flow chart of literature search.

ND = not done

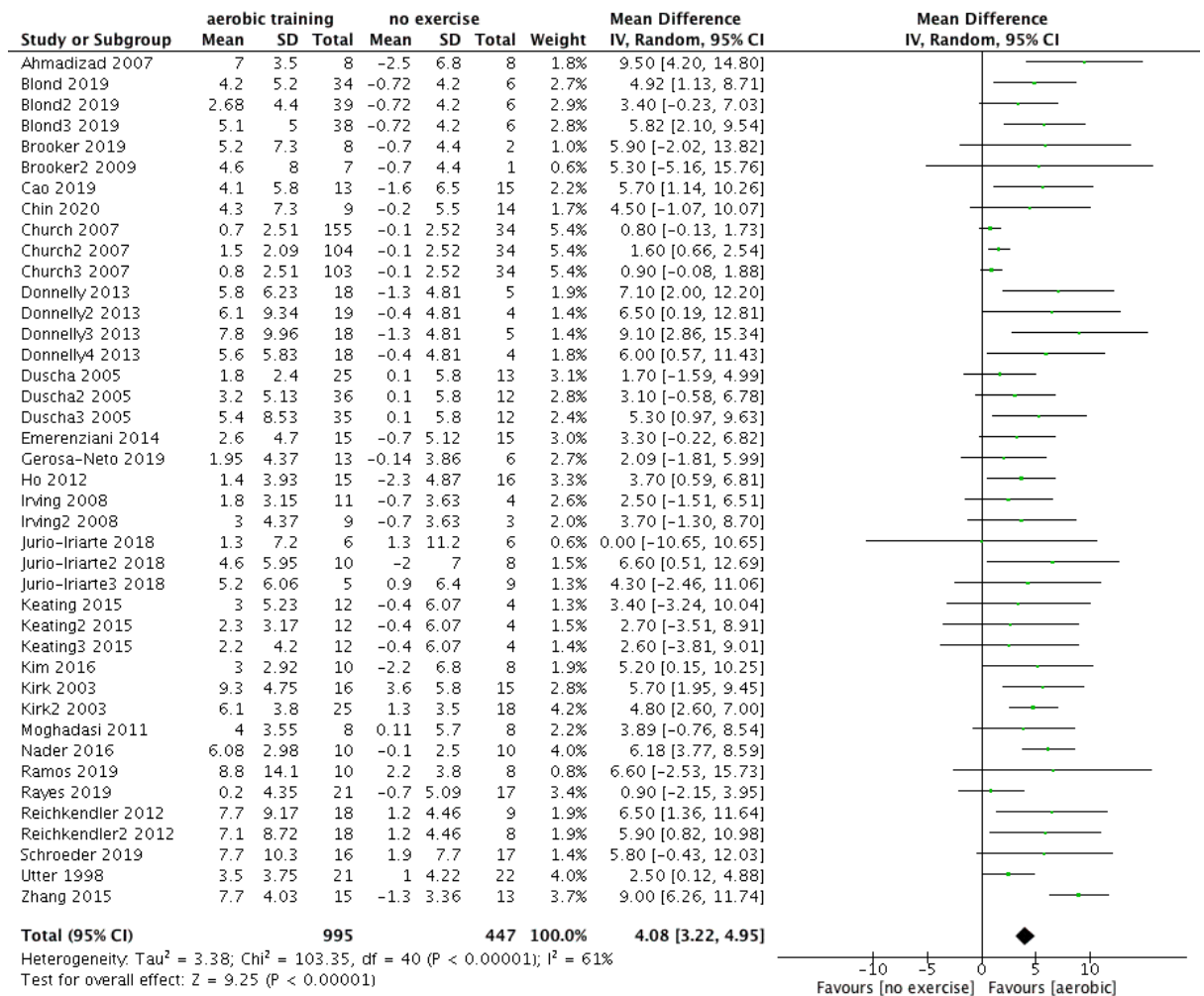


Figure S2. Forest plot of the effect of aerobic training vs no training on VO_{2max} in adults with overweight or obesity.

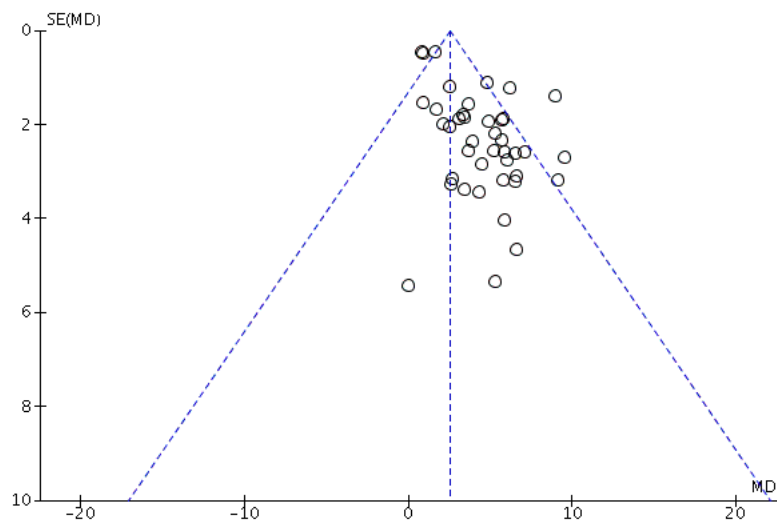


Figure S3. Funnel plot of the effect of aerobic endurance training on VO_{2max} in adults with overweight or obesity.

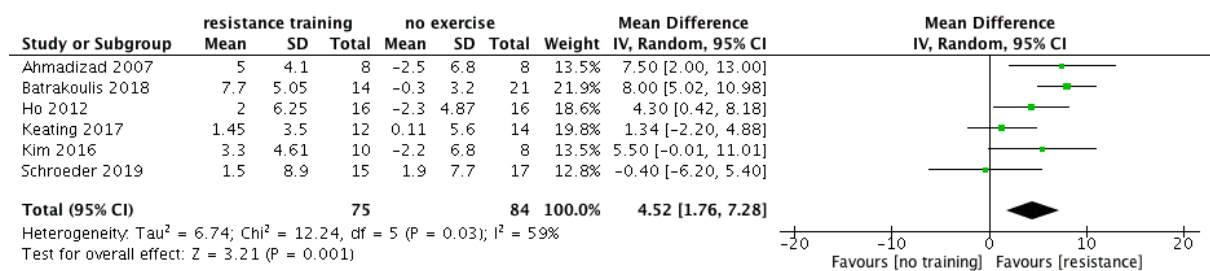


Figure S4. Forest plot of the effect of resistance training vs no training on VO_{2max} in adults with overweight or obesity.

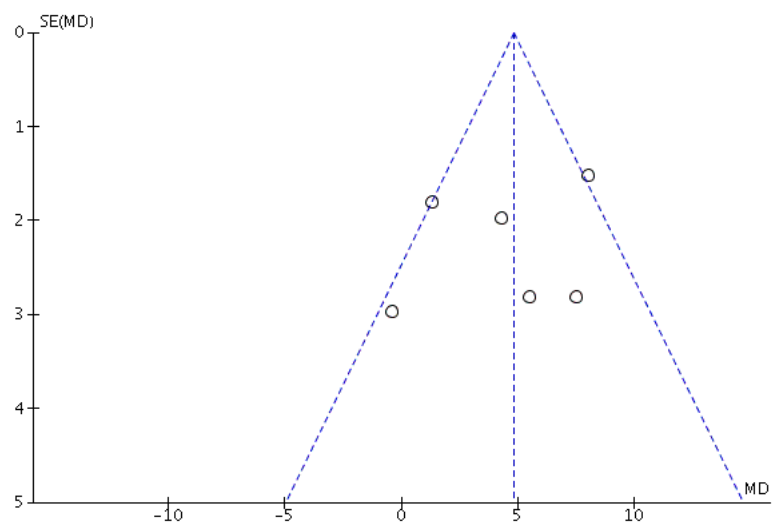


Figure S5. Funnel plot of the effect of resistance training vs no training on VO_{2max} in adults with overweight or obesity.

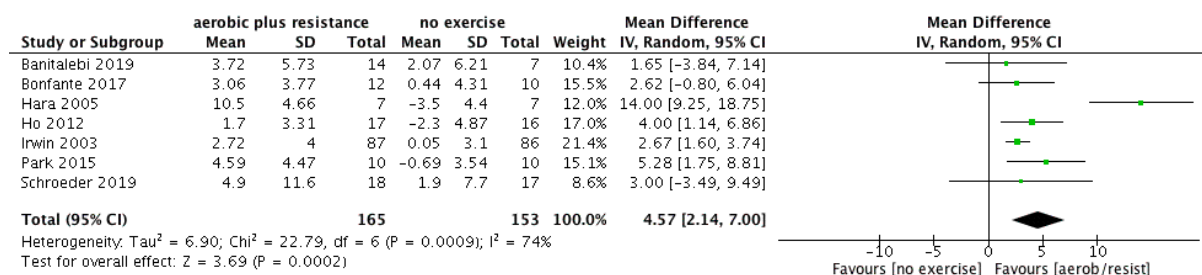


Figure S6. Forest plot of the effect of aerobic plus resistance training vs no training on VO_{2max} in adults with overweight or obesity.

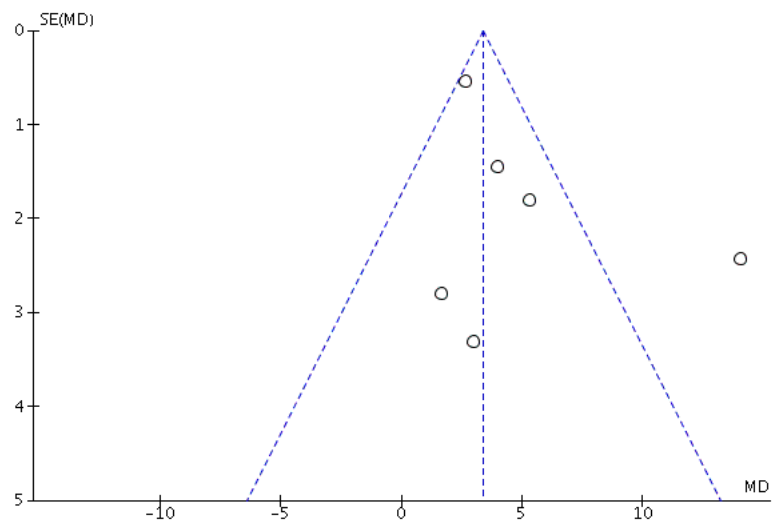


Figure S7. Funnel plot of the effect of resistance training vs no training on VO_{2max} in adults with overweight or obesity.

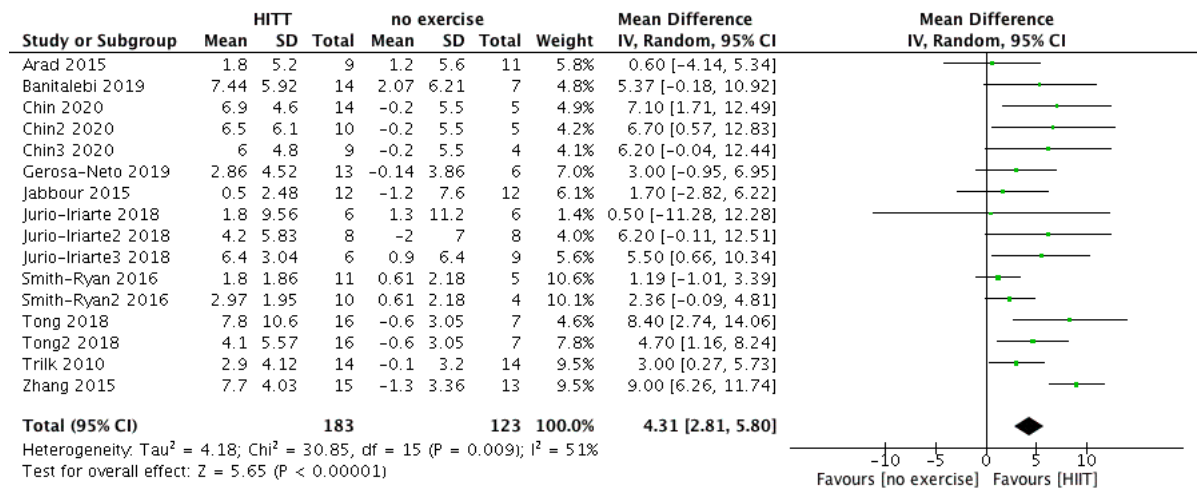


Figure S8. Forest plot of the effect of high-intensity interval training (HIIT) vs no training on VO_{2max} in adults with overweight or obesity.

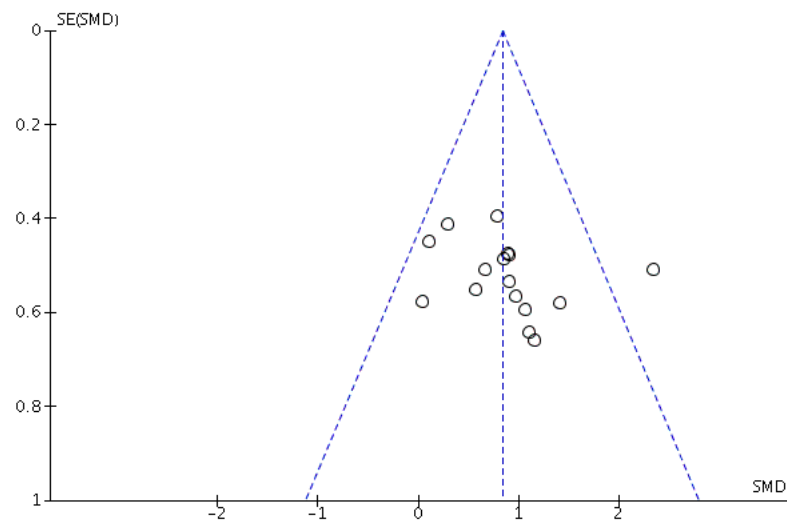


Figure S9. Funnel plot of the effect of high-intensity interval training (HIIT) on VO_{2max} in adults with overweight or obesity.

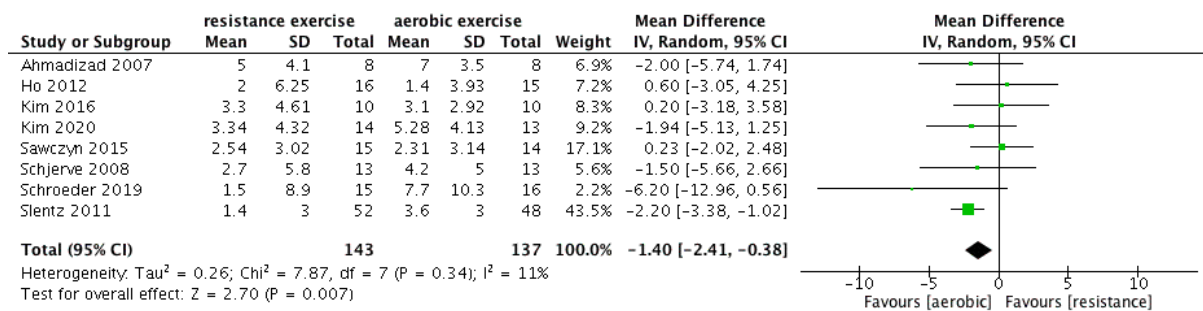


Figure S10. Forest plot comparing the effects of resistance training with aerobic training on $VO_{2\max}$ in adults with overweight or obesity.

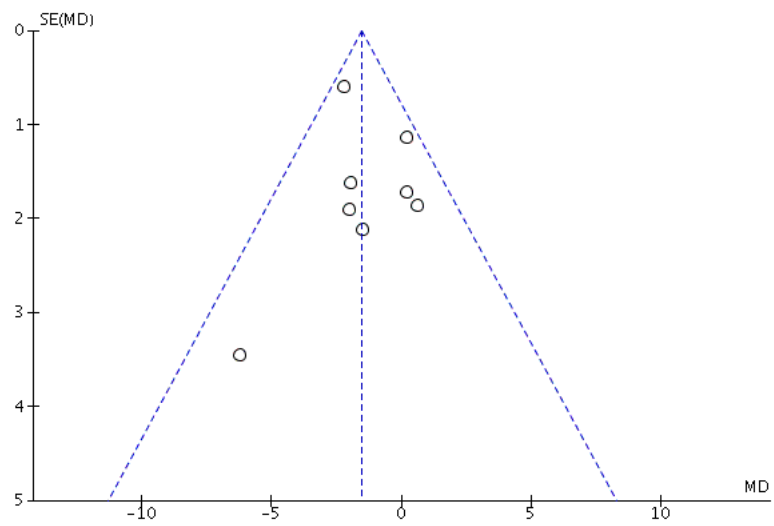


Figure S11. Funnel plot of studies comparing the effects of aerobic and resistance training on $VO_{2\max}$ in adults with overweight or obesity.

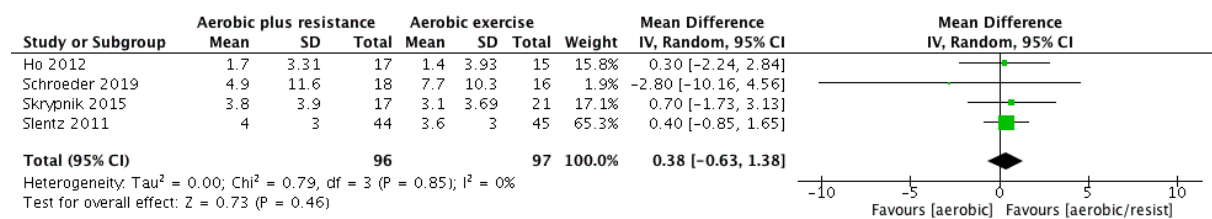


Figure S12. Forest plot comparing the effects of combined aerobic plus resistance training with aerobic training on VO_{2max} in adults with overweight or obesity.

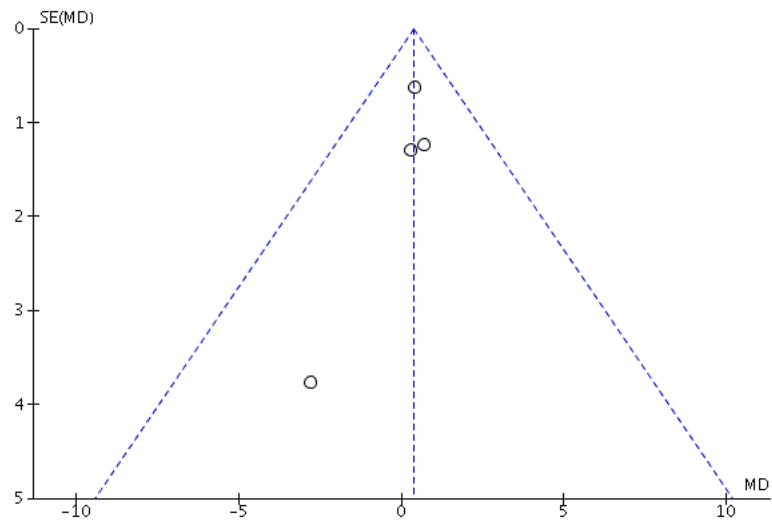


Figure S13. Funnel plot of studies comparing the effects of combined aerobic plus resistance training and aerobic training on VO_{2max} in adults with overweight or obesity.

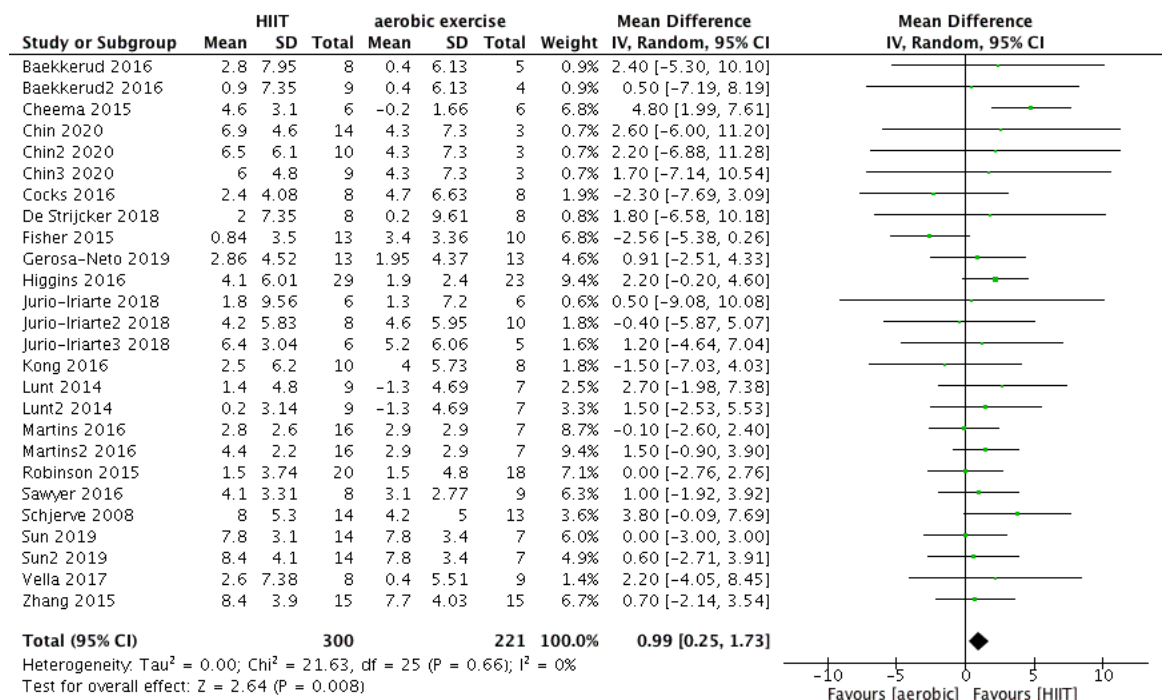


Figure S14. Forest plot comparing the effects of HIIT with aerobic training on VO_{2max} in adults with overweight or obesity.

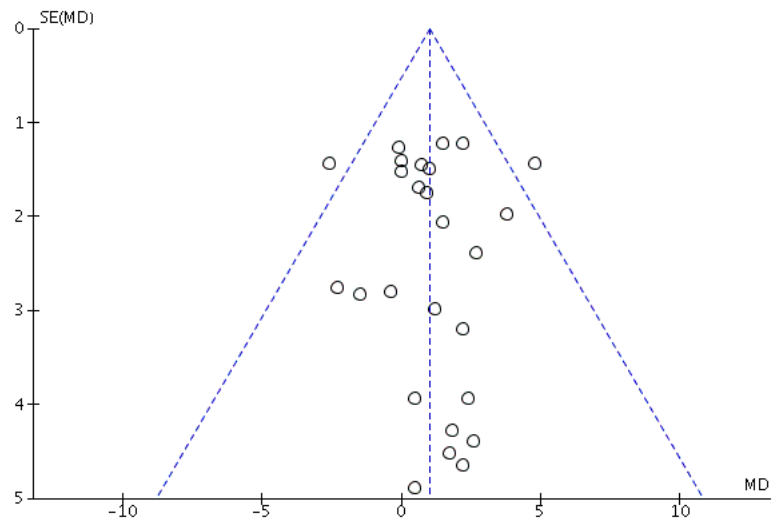


Figure S15. Funnel plot of studies comparing the effects of HIIT and aerobic training on VO_{2max} in adults with overweight or obesity.

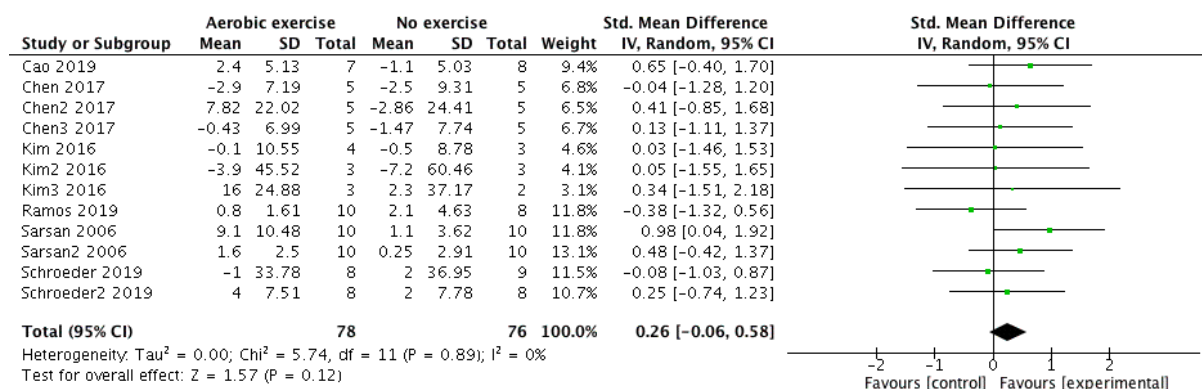


Figure S16. Forest plot comparing the effects of aerobic training vs no training on muscle strength in adults with overweight or obesity.

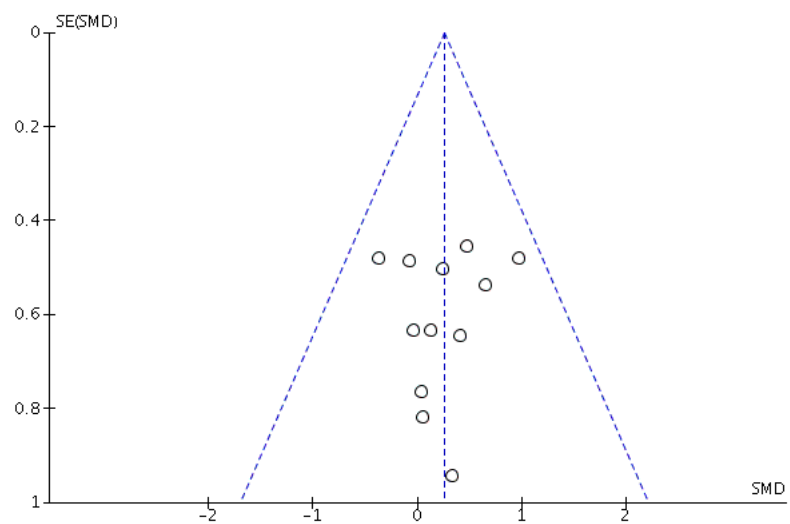


Figure S17. Funnel plot of the effect of aerobic training on muscle strength in adults with overweight or obesity.

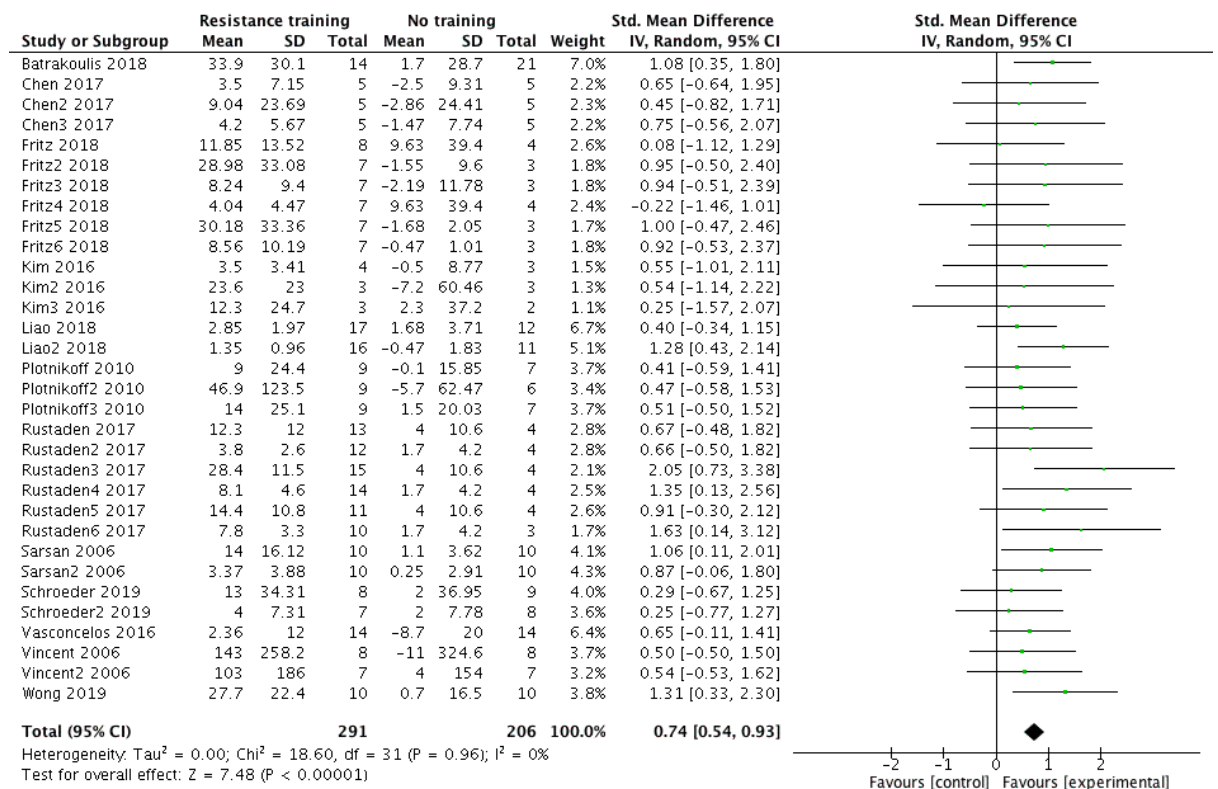


Figure S18. Forest plot comparing the effects of resistance training vs no training on muscle strength in adults with overweight or obesity.

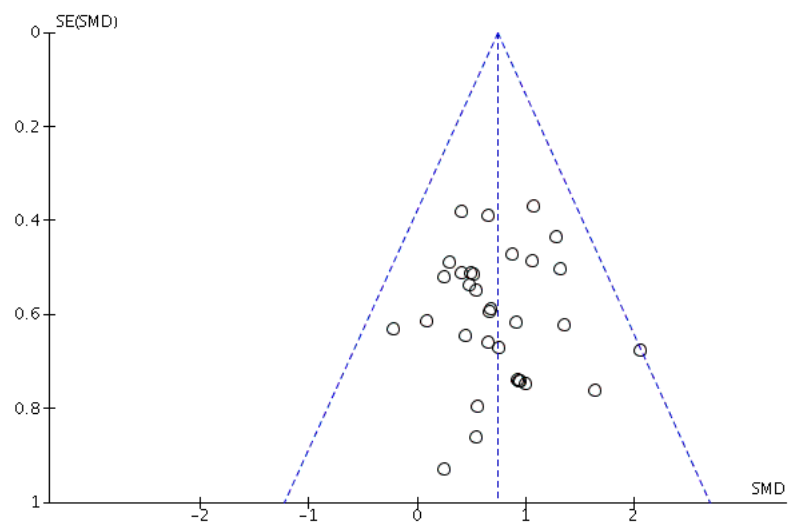


Figure S19. Funnel plot of the effect of resistance training on muscle strength in adults with overweight or obesity.

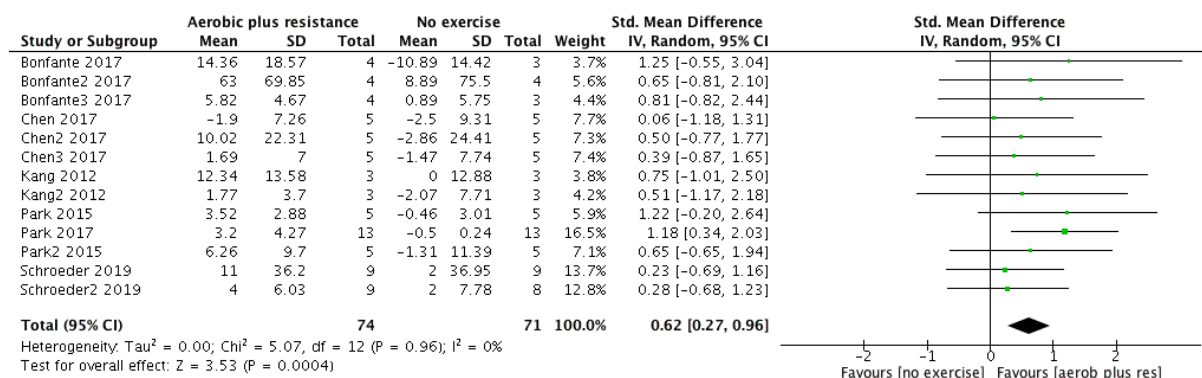


Figure S20. Forest plot comparing the effects of combined aerobic plus resistance training vs no training on muscle strength in adults with overweight or obesity.

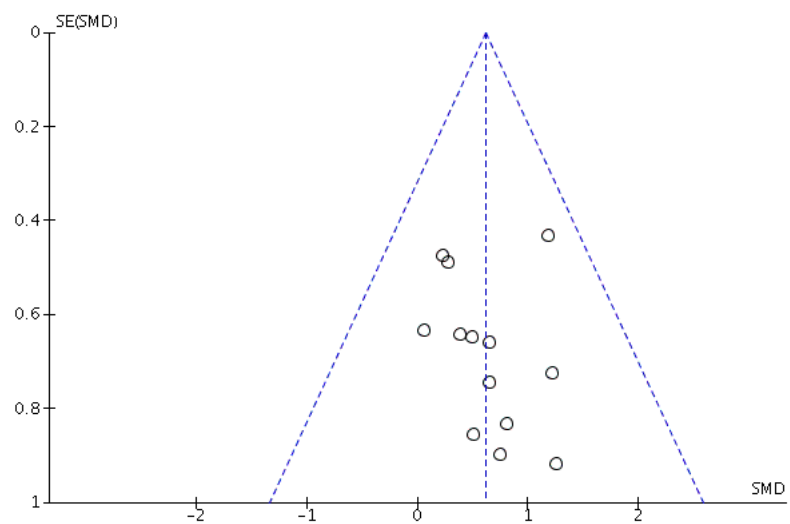


Figure S21. Funnel plot of the effect of combined aerobic plus resistance training on muscle strength in adults with overweight or obesity.

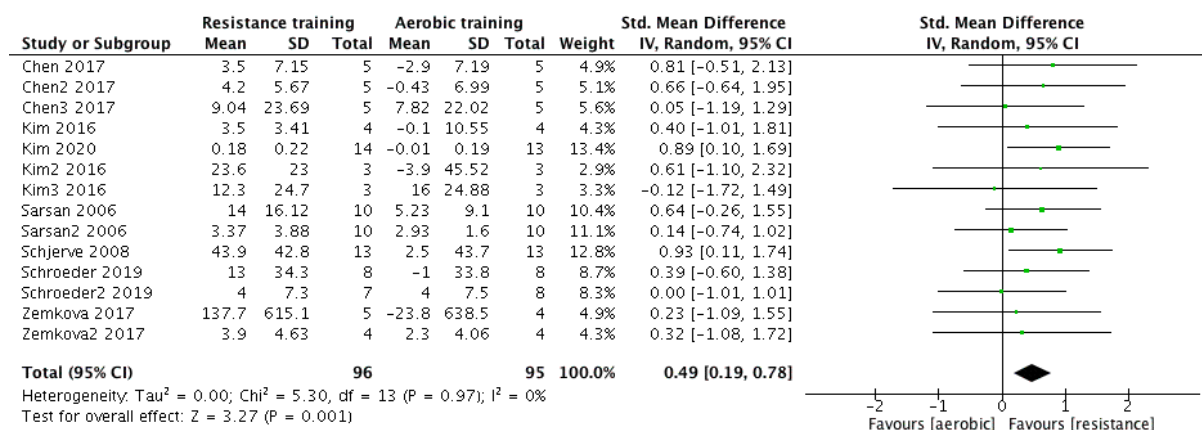


Figure S22. Forest plot comparing the effects of resistance training vs aerobic training on muscle strength in adults with overweight or obesity.

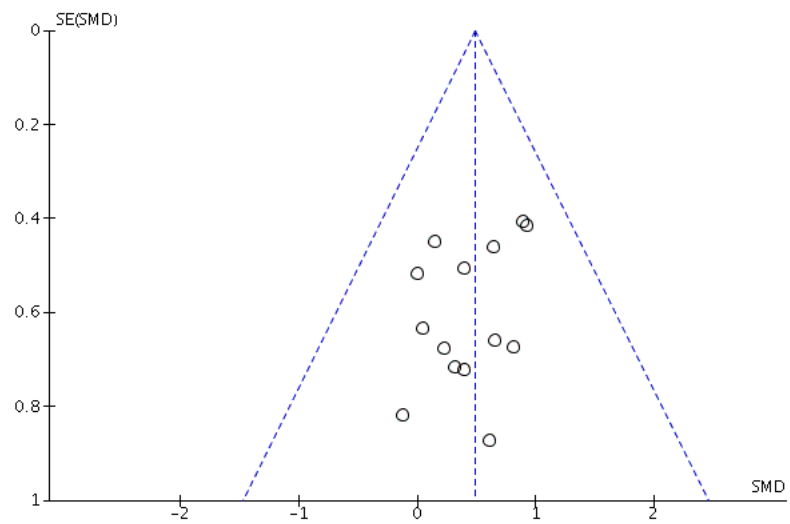


Figure S23. Funnel plot of the effect of resistance training vs aerobic training on muscle strength in adults with overweight or obesity.

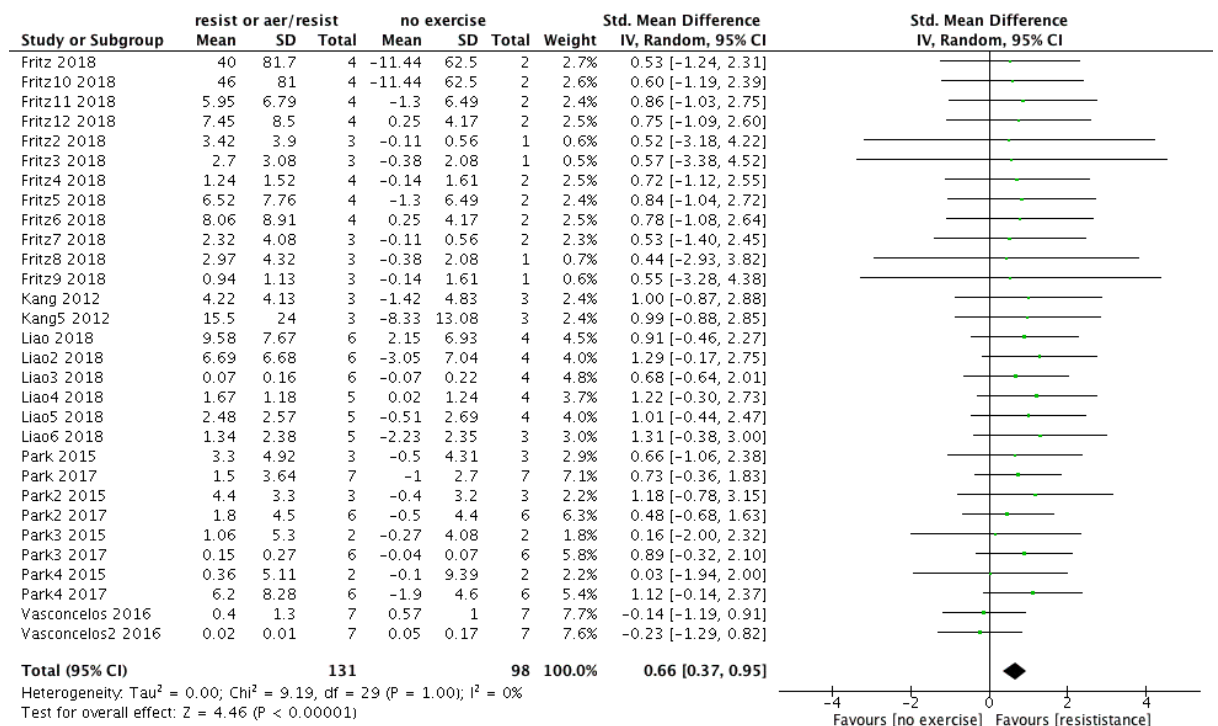


Figure S24. Forest plot of the effects of resistance training alone or in combination with aerobic training on parameters of physical fitness (flexibility, balance, walking speed, global physical capacity score) in adults with overweight or obesity.

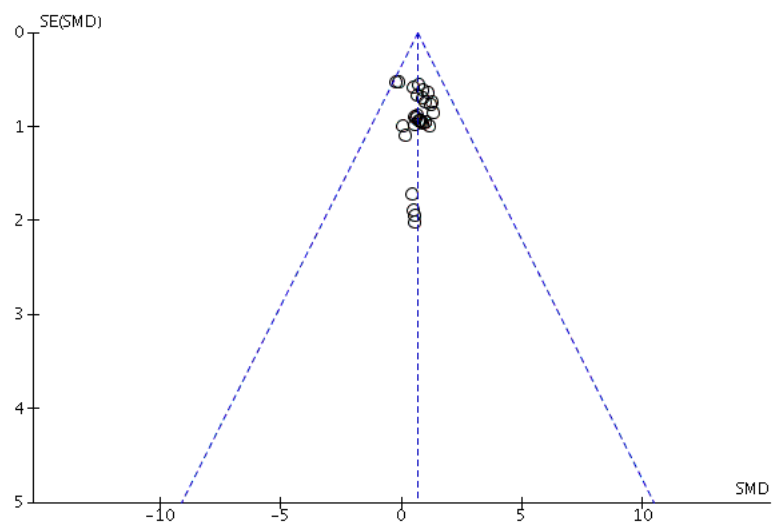


Figure S25. Funnel plot of the effect of resistance training on parameters of physical capacity in adults with overweight or obesity.